2. Computer-based design methodology that integrates market technical/financial data for optimal design comprising:

first, an integrated pipe design, selection and full function procurement system comprising:

a project definition module with a project, case tree structure and data storage capabilities for logical storage, retrieval, and use enabling the user to easily keep track of various projects and alternative cases, use existing data of other projects to create a new project eliminating entry of standard data again and again, and easily store and retrieve data to perform additional calculations;

a hydraulics design module, which performs the hydraulics calculations necessary for the mechanical design;

a pipe mechanical design module;

an interface for dynamic connectivity between market (technical and financial) data;

a search and selection module considering optimization objective functions and constraints;

a results display layer; and

a decision layer that enables iterations at multiple levels for refining search and optimizing results;

and second, an integrated probabilistic optimized reliability/risk based design (ORBD™)

methods which uses dynamic market technical and financial data coupled with constrained

based optimization techniques for optimal risk weighted design and procurement comprising:

a project definition module with a project, case tree structure and data storage

capabilities for logical storage, retrieval, and use enabling the user to easily keep

track of various projects and alternative cases, use existing data of other projects to

create a new project eliminating entry of standard data again and again, and easily

store and retrieve data to perform additional calculations;

a load calculation module, which considers different limit states and various physical

parameters and their variability to determine the probability distribution function of

load;

a module that considers the range of materials to consider for application;

an input module for commercial and optimization parameters;

a module for specifying design parameter and design methods;

an interface for dynamic connection to probabilistic technical data from the

marketplace;

a design calculation module, which uses the said data to perform design and

engineering and optimization calculations;

a search selection module using optimization results;

a results display layer;

a decision layer that enables multiple iteration entry points to further optimize and refine selection; and

a marketplace and back office connectivity layer that enables back office processes and full function procurement.

3. A computer-based method and a system of mathematical techniques that simultaneously combine engineering and commercial variables for optimal risk weighted economic decisions comprising:

a method for constructing engineering equations and optimization objective functions and constraints;

a set of methods and algorithms to solve different classes of equations; and

a probabilistic method of design combined with above said methods for risk/reliability-weighted optimization.

4. A computer-based system for dynamic integrated collaborative engineering and procurement for improved cycle time and productivity comprising:

a software platform that integrates engineering technologies and commercial back office and procurement systems;

a system with real-time links to external marketplaces;

a link system that seamlessly connects buyers and sellers for transactions and fulfillment;

a design and engineering method, which accesses and uses real-time market data to obtain optimal results;

a system to analyze results, evaluate alternative scenarios and search for better results;

a direct and seamless link to back office system and marketplace for procurement; and

a dynamic link to marketplace to execute all marketplace functions including transactions, financial services, fulfillment, logistics and other services.

5. A software system of the above which is web-centric and is deployed as a hosted environment comprising:

a hub on the Internet, which hosts all the technologies, specific content/data, marketplace functionalities, links to other marketplaces and other services;

a local format for the database, which is specific to the technologies and their operations;

a security system that will enable users store and access their project specific data on a continual basis; and

a secure system that will mark and store supplier data that is unique to the user.

6. An extension to the system in claim 5, which will enable the deployment of the hub on a client infrastructure for access on local area networks.

7. A computer-based method for design and engineering technologies, integration methods and optimization of engineering-to-procurement business process supply chain, comprising:

    storing all the necessary information related to such design, engineering and procurement technologies and processes in a computer, random access memory, magnetic storage device, or an optical storage device;

    linking said computer to at least one user terminal through a data communication link; and

    displaying, at said user terminal, information concerning design, engineering and procurement technologies and processes.

8. A computer-based method, as defined above, wherein storing includes storing information regarding all parameters and probability distribution functions required in design, engineering and optimization calculations, and risk factors and historical values of various categories of risk used to evaluate risk weighted decisions; and all data related to procurement, financial, and fulfillment functions; and equipment and material data comprising material specification,

codes, reference numbers, etc; and market data comprising availability, quantity, inventory, shipping methods and duration, rates, user specific rates, etc.